

# Innovative Housing Grants Program

## DEVELOPMENT OF NEW EQUIPMENT FOR MAKING CURVED WOOD PRODUCTS

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JUN 21 1993

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### INTRODUCTION

Demand for aesthetic features like arches, curved stairs and windows with curved segments is on the rise in the housing industry. This consumer-driven demand is evident in both new home construction and renovation. With this increased demand, a need has arisen for affordable production-oriented equipment. Existing equipment can be expensive, and has many limitations.

The purpose of this project was to develop affordable, production-oriented equipment that can efficiently handle the procedures commonly involved in manufacturing curved wood products - lamination, shaping, milling and profiling - and can be used for the manufacture of most or all curved wood products popular in current residential construction.

### METHODS

Project work commenced with the identification of currently available machines and examination of their features. From this examination, the inventor developed a generalized list of

preferred improvements which, in his opinion, could be incorporated into new equipment. These became primary design parameters for the equipment developed through this project. Prototypes were subsequently built according to design, and tested for performance assessment.

### FINDINGS

The inventor identified three general areas where improvements over currently available machines could be achieved by innovative design:

1. Existing equipment is expensive to operate. It requires extensive labour to prepare for a particular job. Often the setup time is much longer than the actual job time.
2. Existing equipment has limited versatility in terms of the range of shapes and sizes of arched products that can be made. Also, most existing machines can handle either job-lot or custom "one-of" work, but not usually both types.

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Report: 52 pages  
Date: January 1993  
ISBN: 0-88654-392-4



3. Existing machines are prone to human error because of extensive requirements for operator intervention.

Original intentions were to design and build one complex piece of equipment to handle all facets of the arch-making process. However, during the design process it became evident that a series of machines would be required to effectively achieve the intended improvements.

## RESULTS

Four machines were designed, built and tested:

1. the Universal Laminating Device (ULD) - a machine that simultaneously laminates and forms wood members into helical (three-dimensional) arches,
2. the Curvilinear Multi-Rip Saw (CMRS) - a machine for slicing or ripping large formed arches into several thinner arches (rough stock) in one operation,
3. the Vertical Arch Profiling Device (VAPD) - a lightweight upright machine for vertically profiling rough stock, and

4. the Horizontal Arch Profiling Device (HAPD) - a lightweight upright machine for horizontally profiling rough stock.

Each prototype was tested, and improvements were made where necessary. The final prototypes met initial design parameters by:

1. reducing set-up times and required floor space, thus increasing productivity potential and improving operating cost-effectiveness,
2. adapting equally well to production work and one-of-a-kind work, and producing a larger range of product sizes than available from current machines, and
3. reducing the requirement for operator intervention, thus allowing greater control over consistency and quality of finished products.

The machines and their manufacturing process can effectively meet the needs of Alberta's new and retrofit construction industry, where curved wood elements and finishings are increasingly being demanded by homeowners.

